AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions of claims in the application.

1. (Previously Presented): A confocal microscope using liquid crystal, comprising:

an inlet optical part to let a polarized light from an illuminating light source and a straight polarizer onto an object to be observed via a beam splitter, a matrix type liquid crystal device provided with a microlens array on its top part, and an objective lens;

a light detecting part including an imaging device to detect a reflected light or a fluorescent light from the object to be observed via said beam splitter and an imaging lens; and

a control part including a liquid crystal control subpart to control each pixel of said matrix type liquid crystal device,

said microlens array being made up of a plurality of microlenses aligned in an array at positions corresponding to each pixel of said matrix type crystal device,

wherein the light passing through said microlens array from each microlens is transmitted to each pixel of said matrix type liquid crystal device aligned in the position corresponding to said each microlens, a plurality of foci are made on said object to be observed by said objective lens, and the polarization direction of the light transmitted through each neighboring pixel of said matrix type liquid crystal device is controlled using said liquid crystal control subpart, and

said liquid crystal control subpart controls polarization directions of the lights transmitted through each neighboring pixel of the matrix type liquid crystal device so that they are made mutually orthogonal, and makes a plurality of foci with the lights the polarization directions of which are mutually orthogonal onto an object to be observed.

2. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 1, wherein a polarizer is located in the lower part of said matrix type liquid crystal device and a polarized light transmitted through said polarizer is controlled by each pixel of said matrix type liquid crystal.

3. (Currently Amended): A confocal microscope using liquid crystal, comprising:

a inlet optical part to let a polarized light from an illuminating light source and a straight polarizer onto an object to be observed via a beam splitter, a lens, and a first matrix type liquid crystal device provided with a first microlens array on its top part,

a light detecting part including an imaging device to detect a reflected light or a fluorescent light from an object to be observed via said beam splitter, an imaging lens, and a second matrix type liquid crystal device provided with a second microlens array on its top part; and

a control part including a first and a second liquid crystal control subpart to control a polarization direction of a light transmitted through each pixel of said first and second matrix type liquid crystal device,

said first microlens array being made up of a plurality of microlenses aligned in an array at positions corresponding to each pixel of said first matrix type crystal device; and

said second microlens array being made up of a plurality of microlenses aligned in an array at positions corresponding to each pixel of said second matrix type liquid crystal device,

wherein the light passing through said first microlens array from each microlens is transmitted to each pixel of said first matrix type liquid crystal device aligned in the position corresponding to said each microlens, and a plurality of foci are made on said object to be observed,

wherein said reflected light or fluorescent light passing through said second microlens array from each microlens array is transmitted to each pixel of said second matrix type liquid crystal device aligned in the position corresponding to each microlens, a plurality of foci are made on said imaging device, and the polarization direction of the light transmitted through each pixel of the first matrix type liquid crystal device is controlled using the first liquid crystal control subpart, [[and]]

wherein said first liquid crystal control subpart controls polarization directions of the lights transmitted through each neighboring pixel of said first matrix type liquid crystal device to be mutually orthogonal, thereby making a plurality of foci with the lights the polarization directions of which are mutually orthogonal onto an object to be observed, the polarization direction of the light transmitted through each pixel of said second matrix type liquid crystal device is controlled using the second liquid crystal control subpart, and said second liquid crystal control subpart controls polarization directions of the lights transmitted through each neighboring pixel of said second matrix type liquid crystal device to be mutually orthogonal, thereby making a plurality of foci with the lights the polarization directions of which are mutually orthogonal onto an imaging device, and

wherein said first and second microlens arrays are separate, and said first and second

liquid crystal devices are separate.

4. (Canceled)

5. (Canceled)

6. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 3, wherein a polarizer is located in the lower part of said first matrix type liquid crystal device, and a polarization direction of the light transmitted through said polarizer is controlled by each pixel of said first matrix type liquid crystal.

7. (Currently Amended): A confocal microscope using liquid crystal, comprising:

an inlet optical part to let an amplitude modulated polarized light from an illuminating light source onto an object to be observed via a beam splitter, a matrix type liquid crystal device provided with a microlens array on its top part, and an objective lens;

a light detecting part including an imaging device to detect a reflected light or a fluorescent light from the object to be observed via said beam splitter and an imaging lens; and

a control part including a liquid crystal control subpart to control each pixel of said matrix type liquid crystal device, and an amplitude modulation control part of said illuminating light source,

said microlens array being made up of a plurality of microlenses aligned in an array at

positions corresponding to each pixel of said matrix type crystal device; and

said amplitude modulated polarized light being modulated by a frequency or a plurality of different frequencies,

wherein the light passing through said microlens array from each microlens is transmitted to each pixel of said matrix type liquid crystal device, a plurality of foci are made on said object to be observed by said objective lens, the polarization directions of the lights transmitted through each pixel of said matrix type liquid crystal device are controlled so that they are made mutually orthogonal by using said liquid crystal control subpart, and amplitude modulation signals of the reflected light or fluorescent light are detected from said object to be observed by transforming them to frequency component signals, and

wherein said illuminating light source is the only light source used.

8. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 7, wherein a polarizer is located in the lower part of said matrix type liquid crystal device, and an polarized light transmitted through said polarizer is controlled by each pixel of said matrix type liquid crystal.

9. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 7, wherein said illuminating light source is of either single wavelength or multi wavelengths, and said illuminating light source is amplitude modulated by using either a matrix type liquid crystal device, an acoustooptic modulator, or a digital mirror device.

10. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 7 or 9, wherein the amplitude modulation for each wavelength of said illuminating light source is applied to each pixel by a plurality of modulation frequency.

11. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 7, wherein the conversion of amplitude modulation signals of the reflected or fluorescent light from said object to be observed to frequency signals is operation-processed by high speed Fourier transform.

12. (Currently Amended): A confocal microscope using liquid crystal, comprising:

a inlet optical part to let an amplitude modulated polarized light from an illuminating light source onto an object to be observed via a beam splitter, a lens, and a first matrix type liquid crystal device provided with a first microlens array on its top part,

a light detecting part including an imaging device to detect a reflected light or a fluorescent light from the object to be observed via said beam splitter, an imaging lens, a second matrix type liquid crystal device provided with a second microlens array on its top part, and a condenser lens; and

a control part including a first and a second liquid crystal control subpart to control a polarization direction of a light transmitted through each pixel of said first and second matrix type liquid crystal device,

said first microlens array being made up of a plurality of microlenses aligned in an array positions corresponding to each pixel of said first matrix type crystal device,

said second microlens array being made up of a plurality of microlenses aligned in an array at the positions corresponding to each pixel of said second matrix type crystal device,

said amplitude modulated polarized light being modulated by a frequency or a plurality of different frequencies,

wherein the light passing through said first microlens array from each microlens is transmitted to each pixel of said first matrix type liquid crystal device, and a plurality of foci are made on said object to be observed, [[and]]

wherein said reflected light or fluorescent light passing through said second microlens array from each microlens array is transmitted to each pixel of said second matrix type liquid crystal device, a plurality of foci are made on said imaging device, the polarization direction of the light transmitted through each pixel of said first and second matrix type liquid crystal devices is controlled using said first and second liquid crystal control subpart, and amplitude modulation signals of the reflected or fluorescent light are detected from said object to be observed by converting them to frequency signals,

wherein said first and second microlens arrays are separate, and said first and second liquid crystal devices are separate, and

wherein said illuminating light source is the only light source used.

13. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 12, wherein said first liquid crystal control subpart of said inlet optical part controls polarization directions of the lights transmitted through each pixel of said first matrix type liquid crystal device so that they are made mutually orthogonal.

14. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 12, wherein said second liquid crystal control subpart of said light detecting part controls polarization directions of the lights transmitted through each pixel of said second matrix type liquid crystal device so that they are made mutually orthogonal.

15. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 12, wherein a polarizer is located in the lower part of said first matrix type liquid crystal device, and the polarized light transmitted through said polarizer is controlled by each pixel of said matrix type liquid crystal.

16. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 12, wherein said illuminating light source is of either single wavelength or multi wavelengths, and said illuminating light source is amplitude modulated by using either a matrix type liquid crystal device, an acoustooptic modulator, or a digital mirror device.

17. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 12 or 16, wherein the amplitude modulation for one wavelength of said illuminating light source is applied to each pixel by a plurality of modulation frequency.

18. (Previously Presented): The confocal microscope using liquid crystal as set forth in claim 12, wherein the transform from the amplitude modulation signal of the reflected or fluorescent light of said object to be observed to frequency signal is processed by Fast Fourier Transform.

19. (Previously Presented): A method of measuring fluorescence of a microarray substrate by a confocal microscope using liquid crystal, wherein for the fluorescence measurement of a microarray substrate with a fluorescent material as a selective marker given in advance, the fluorescence from said fluorescent material is observed by using a confocal microscope using liquid crystal as set forth in claim 7 or 12.

20. (Previously Presented): The method of measuring fluorescence from a microarray substrate by a confocal microscope using liquid crystal as set forth in claim 19, wherein said microarray substrate contains a minute amount of DNA or a biological material.

21. (Previously Presented): The method of measuring fluorescence from a microarray substrate by a confocal microscope using liquid crystal as set forth in claim 19, wherein said microarray substrate is a DNA chip.

22. (Previously Presented): A method of measuring polarized light by said confocal microscope, wherein for measuring polarized light from the reflected or fluorescent light from an object to be observed, the polarized light from said object to be observed is measured by using a confocal microscope using liquid crystal as set forth in claim 7 or 12.

23. (Previously Presented): The method of measuring polarized light by the confocal microscope using liquid crystal as set forth in claim 22, wherein in the liquid crystal matrix of said confocal microscope using liquid crystal, the polarized light from said object to be observed is measured by rotating said polarized light by 180 degrees.

24. (Previously Presented) A method of measuring fluorescence of a microarray substrate by a confocal microscope using liquid crystal, wherein for the fluorescence measurement of a microarray substrate with a fluorescent material as a selective marker given in advance, the fluorescence from said fluorescent material is observed by using a confocal microscope using liquid crystal as set forth in any one of claims 1, 2, 3, and 6.

25. (Previously Presented) The method of measuring fluorescence of a microarray substrate by a confocal microscope using liquid crystal as set forth in claim 24, wherein said microarray substrate contains a minute amount of DNA or a biological material.

26. (Previously Presented): The method of measuring fluorescence of a microarray substrate by a confocal microscope using liquid crystal as set forth in claim 24, wherein said microarray substrate is a DNA chip.

27. (Previously Presented) A method of measuring polarized light by said confocal microscope, wherein for measuring polarized light from the reflected or fluorescent light from an object to be observed, the polarized light from said object to be observed is measured by using a confocal microscope using liquid crystal as set forth in any one of claims 1, 2, 3, and 6.

28. (Previously Presented) The method of measuring polarized light by a confocal microscope using liquid crystal as set forth in claim 27, wherein in the liquid crystal matrix of said confocal microscope using liquid crystal, the polarized light from said object to be observed is measured by rotating said polarized light by 180 degrees.